**Assignment #9**

**Objective**

Learn to visualize data with Matplotlib and explore the Bokeh visualization library.

**Due**

Before 9am on March 5th. Commit your completed Jupyter notebooks to your GitHub repository. And when completed let Dr. Ficklin know via Slack that it is available. Please indicate the amount of time the assignment took to complete.

**Tasks**

Task A: MatlibPlot

Matlibplot is a library for plotting in python. You have already seen it used in some of the assignments we have worked on in the past. Now, we will dig a bit deeper! You can learn more about Matplotlib from its home page: <https://matplotlib.org/>. Please complete the tutorial for Matplotlib at this URL: <https://www.labri.fr/perso/nrougier/teaching/matplotlib/>. Duplicate the code in the first portion of this tutorial into a Jupyter notebook. The tutorial provides new code at each additional step. You will need to determine the best place to add these code updates to adjust the plot. Skip the section titled **Animation**. Afterwards a section titled **Other Types of Plots** provides exercises for you to complete. The author provides an image, some start code and asks that you complete the code to reproduce the plot. Please choose 2 or 3 plots that you find most useful for your current research needs and try to reproduce the plots. Turn in a Jupyter notebook with the executed code examples as well as the 2 or 3 plots you recreated. *Note*, that the author fails to indicate that for plots to appear in your Jupyter notebook, you must add the following line at the top of your notebook:

%matplotlib inline

Task B: Bokeh

Bokeh is a dynamic, interactive plotting library for python. It has a broad array of graphing tools. A major application for Bokeh is creation of interactive graphs for online web-presentations. As such, we can use it in Jupyter. You can read a brief introduction about it on the home page: <https://bokeh.pydata.org/en/latest/>. To complete this portion, we will use an online tutorial housed in the bokeh-notebook GitHub repository: <https://github.com/bokeh/bokeh-notebooks>. You only need to complete tutorial numbers 1 and 4. Follow these instructions:

* Using your knowledge of Git, clone the bokeh-notebook repository.
* From within the “tutorial” directory of the cloned bokeh-notebook repository, copy these Jupyter notebook files to your Assignment09 directory:
  + 01- - Basic Plotting.ipynb
  + 04 – Data Sources and Transformations.ipynb
* These two files are Jupyter notebooks. You can open them directly from your Jupyter session.

Within the tutorial, there are exercise sections you must complete. Be sure to turn in both notebooks with completed exercise to your GitHub repository.

Task C: Self-Guided

**Work no more than 2 hours on this part unless you feel interest to do more. If you have spent more than 6-9 hours on the previous two tasks you can skip this one.** We will share and finish them in class. It is ok to not finish.

* Look through the examples at either matplotlib or bokeh.
  + Matplotlib Examples: <https://matplotlib.org/gallery/index.html>
  + Bokeh Examples: <https://bokeh.pydata.org/en/latest/docs/gallery.html>
* Select a style of plot that interests you. You may select a plot that would be appropriate for data you use in your own graduate research.
* Find or generate data that is amenable to the plot type.
* Use a Jupyter notebook to create your selected plot